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TITLE: PRODUCTION OF COATED PAPER FOR PRINTING

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ABSTRACT:

PURPOSE: To obtain coated paper having strong stiffness, high gloss and excellent printing workability.

CONSTITUTION: Coated paper for printing is produced by coating base paper with a coating composition composed mainly of a pigment and an adhesive, drying the coating layer and subjecting to calender finishing. In the above process, the pigment contains (A) 50-98 pts.wt. kaolin having plate form and having a diameter and an aspect ratio (diameter/thickness ratio) satisfying the following formulas (1) and (2) and (B) 2-30 pts.wt. hollow plastic pigment and the coating composition is incorporated with 10-50wt.% (based on the pigment) water-soluble binder as the adhesive.  $12 \cdot (\text{diameter/thickness}) \cdot 20 \dots (1)$ ,  $0.5 \cdot \text{m} \cdot (\text{diameter}) \cdot 3 \cdot \text{m} \dots (2)$ .

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**Notes:**

1. Untranslatable words are replaced with asterisks (\*\*\*).
2. Texts in the figures are not translated and shown as it is.

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Dictionary: Last updated 11/13/2009 / Priority: 1. Chemistry / 2. JIS (Japan Industrial Standards) term / 3. Mathematics/Physics

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## CLAIM + DETAILED DESCRIPTION

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**[Claim(s)]**

[Claim 1] In a manufacturing method of coated paper for printing which carries out after [ application desiccation ] calender finishing, an application constituent which makes a pigment and adhesives a principal component on stencil paper, [ as a pigment ] It is tabular and a ratio (aspect ratio) and a diameter of a diameter and thickness The following formula (1), A manufacturing method of coated paper for printing having contained the kaolin 50 - 98 weight sections, and the hollow plastics pigment 2 - 30 weight sections that satisfy (2), and making a water soluble binder blend ten to 50weight % to a pigment as adhesives.

$12 \leq \text{diameter} / \text{thickness} \leq 20 \dots (1)$

$0.5 \mu\text{m} \leq \text{diameter} \leq 3 \mu\text{m} \dots (2)$

[Claim 2] A manufacturing method of the coated paper for printing according to claim 1 whose skin temperature of a metallic roll of a calender when carrying out calender finishing is 100-250 \*\*.

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**[Detailed Description of the Invention]**

[0001]

[Industrial Application] About the manufacturing method of the coated paper for printing, especially this invention has [ whenever / Takeshi ] what is called strong paper stiffness, and relates to the manufacturing method of the coated paper for printing which has the high gloss excellent in printing operability.

[0002]

[Description of the Prior Art] In recent years, the environmental problem is thought as important and the weight saving of the position of paper resource conservation to a paper product is important SUBJECT. On the other hand, in the case of the coated paper for printing, the glossiness of an application side and improvement in smooth nature are especially demanded with visual-izing of printed matter, colorization, and an upgrading

inclination. And in order to carry out the weight saving of the coated paper, stencil paper and the amount of applications must be lowered and it is made for the fall of gloss and the fall of the paper stiffness by reduction in thickness of paper to be produced as the result. It this not only causes the fall of print job nature, but spoils the commodity value of result printed matter. It has been present SUBJECT to solve the difficulty like the above derived in connection with the weight saving of coated paper.

[0003]

[Problem(s) to be Solved by the Invention]the actual condition like the above -- this invention -- high -- it is, and having high gloss and providing the manufacturing method of the strong coated paper for printing of paper stiffness.

[0004]

[Means for solving problem]In the manufacturing method of the coated paper for printing which carries out after [ application desiccation ] calender finishing, the application constituent which makes a pigment and adhesives a principal component on stencil paper, [ as a pigment ] It is tabular and the ratio (aspect ratio) and diameter of a diameter and thickness The following formula (1), It is a manufacturing method of the coated paper for printing having contained the kaolin 50 - 98 weight sections, and the hollow plastics pigment 2 - 30 weight sections that satisfy (2), and making a water soluble binder blend ten to 50weight % to a pigment as adhesives.

$12 \leq \text{diameter} / \text{thickness} \leq 20 \dots (1)$

$0.5\text{micrometer} \leq \text{diameter} \leq 3\text{micrometer} \dots (2)$

[0005]

[Function]This invention persons controlled the fall of the gloss by reduction of the weight saving of the coated paper for printing, i.e., stencil paper, and the amount of applications, and paper stiffness, and in order to obtain the more outstanding coated paper for printing, they inquired wholeheartedly. As a result, it found out that the desired coated paper for printing was obtained by blending a specific pigment and adhesives into an application constituent.

[0006]That is, when an aspect ratio and a diameter made a water soluble binder contain  $12 \leq \text{aspect ratio} \leq 20$  and  $0.5\text{micrometer} \leq \text{diameter} \leq 3\text{micrometer}$  kaolin in the 10 to 50 weight % application constituent to 50 to 98 weight section, and a pigment, coated paper with strong paper stiffness was able to be obtained.

[0007]An aspect ratio is a ratio of the diameter of a tabular pigment to thickness, and it is usually expressed here below.

Aspect ratio = a diameter/thickness [0008]Although the aspect ratio is used former comparatively so much [ around ten kaolin ], in this invention, an aspect ratio cannot obtain desired paper stiffness less than 12. On the other hand, if the ratio exceeds 20, although paper stiffness becomes strong, an application layer with few openings between pigment grains is formed, and it induces the poor ink impression by the poor water absorption at the time of printing (offset printing), and is not preferred. Therefore, an aspect ratio is specified like the above.

[0009]Generally, in the application layer provided on stencil paper, the orientation of the pigment grains in which an aspect ratio like kaolin is comparatively big is carried out regularly horizontally. And the resistance (paper stiffness) over the stress to bend has arisen according to this orientation. Incidentally, generally, although influenced by that diameter, paper stiffness becomes strong, so that this aspect ratio is large.

[0010]Even if it fills regulation of the above [ an aspect ratio ], in the case where the diameter of kaolin is less than 0.5 micrometer, the strong paper stiffness for which it asks cannot be obtained. It seems that this is because a horizontal orientation does not happen easily since the diameter of a pigment is small (i.e., since the pigment grains are small). On the other hand, if 3 micrometers is exceeded, paper stiffness will become strong, but it is hard to form the smooth surface and sufficient glossiness and smooth nature cannot be obtained.

[0011]When combination number of copies of kaolin is less than 50 weight sections, the horizontal orientation of kaolin grains is barred by other pigment grains, and cannot reveal the effect [ like / the above ].

[0012]In the case of the coated paper of a thin matter, in this invention, the paper stiffness considered as a request is especially hard to be obtained only by specification of kaolin like the above. Therefore, as a result of repeating examination variously, by blending a water soluble binder so much as adhesives showed that paper stiffness was reinforced. Especially in this invention, a water soluble binder is blended ten to 50weight % to a pigment. If the paper stiffness for which it asks incidentally cannot be obtained by less than 10weight % of a case but another side and 50 weight % are exceeded, although it becomes strong, since almost all the openings in an application layer will be filled up with a binder, and paper stiffness causes poor absorptivity at the time of printing or induces a gloss fall, it is not preferred.

[0013]The paper stiffness for which it asks by this invention by the above by specifying the aspect ratio of kaolin and specification and specification of combination number of copies of a diameter, and also combination number of copies of a water soluble binder is obtained. On the other hand, although the paper stiffness for which it asks was obtained, the gloss for which it asks was not obtained by the influence of a water soluble binder etc. Then, further, as a measure against gloss improvement, as a result of repeating examination, the high coated paper for printing of gloss was able to be obtained very much, without reducing paper stiffness further as a pigment by carrying out 2-30 weight-section addition of the plastics pigment in the air. Incidentally, in less than two weight section of plastics pigments, if the gloss for which it asks is not obtained but 30 weight sections are exceeded, the viscosity of an application constituent will rise and it will interfere with operability.

[0014]Thus, a plastics pigment is guessed as follows as a Reason for contributing to an improvement of gloss. That is, with it being general, since a plastics pigment is thermoplasticity, it seems that it has the character which reveals high gloss easily by calender treatment rather than an earthy color. Since it not only has the character which adds high gloss, but grains have become in midair, a hollow plastics pigment has a high light refractive index, therefore it has an effect which controls the fall of opacity.

[0015]As a pigment, usual kaolin, needlelike precipitated calcium carbonate, cubic shape precipitated calcium carbonate, indeterminate form heavy calcium carbonate, titanium dioxide, zinc oxide, aluminium hydroxide, etc. other than the above-mentioned specific pigment can use it suitably.

[0016]As adhesives, although a water soluble binder is used as a principal component, proteins, such as synthetic resin adhesives, such as starch, such as oxidized starch, positive starch, esterification starch, and dextrin, and polyvinyl alcohol, casein, soybean protein, and synthetic protein, are used for this. Use together to it and For example,

conjugated diene system copolymer latex, such as a styrene butadiene copolymer, Vinyl system polymer latex, such as acrylic copolymer latex, such as a polymer of acrylic ester, or a copolymer, and an ethylene vinyl acetate copolymer, Or the alkali solubility which denaturalized these various polymer latex by functional group content monomers, such as a carboxyl group, It is used by more than kind of the usual adhesives for coated paper, such as various kinds of synthetic resin polymers called alkali swelling nature or alkali undissolved polymer latex, choosing suitably.

[0017]Into an application constituent, various assistants, such as a defoaming agent, a colorant, a release agent, and flow denaturant, are blended suitably if needed. Although the solids concentration of an application constituent is generally about 30 to 75 weight %, when operability is taken into consideration, 35 to 70weight % of the range is desirable.

[0018]Although the application constituent prepared in this way is applied on stencil paper, [ a constituent ] Although it is not limited in particular for the U.S. tsubo of stencil paper, and it can generally be used according to the purpose in the range about 30 to 400 g/m<sup>2</sup>, choosing suitably, The effect is remarkable, when in the case of this invention it points to especially the weight saving of coated paper and applies to the thing about 30 to 80 g/m<sup>2</sup>.

[0019]Especially about a paper machine, it is not limited but paper making is carried out by the long network machine, the twin wire machine, the round mesh machine, and a multilayer round mesh machine. Which methods, such as acid paper making, neutral paper making, and weak alkaline paper making, may be used as a paper-making method. Of course, the neutral stencil paper, used paper recovery pulp combination stencil paper, etc. containing high yield pulp can be used. The stencil paper which carried out the reserve coating by paper machine on-machine coater or size press, or the stencil paper which carried out undercoat by off-coater is usable.

[0020]For example, the blade coater used for general coated paper manufacture as a coating apparatus, An air knife coater, bar coater, BIRUBURED0 coater, curtain coater, The on-machine or off-machine coater which formed both sides or one side coating apparatus, such as dice lot coater, photogravure coater, CHAMPU Rex coater, and size press coater, is used suitably. and -- facing an application -- a stencil paper top -- an application constituent -- much more -- or it is applied to a multilayer.

[0021]As a method of drying a humid application layer, various dry methods, such as steamy heating known from the former, hot blast heating, gas heater heating, high-frequency heating, electric heater heating, infrared heater heating, laser heating, and electron-rays heating, can adopt suitably.

[0022]Although calender finishing treatment of the coated paper obtained in this way is carried out, about a calender pressure and especially the number of nips, it is not limited but is suitably chosen according to the quality demanded. As a calender in this invention, various calenders, such as a super calender, a gloss calender, and a soft compact calender, are used with the form of an on-machine or an off-machine, for example. And the on-machine calender with which the on-machine calender here was built not only into a paper machine but into the coater is also contained.

[0023]In calender treatment, if the skin temperature of a metallic roll is 100-250 \*\*, even if the number of nips and nip pressure will be reduced and it will make bulk density low, the glossiness for which it asks is maintainable, and it is simultaneously effective also

because of improvement in paper stiffness, and can become a more desirable embodiment.

[0024]

[Working example] Although an embodiment is given to below and this invention is more concretely explained to it, of course, it is not limited to the range. The part in an example and especially % show weight section and weight %, respectively, unless it refuses.

[0025] 1.8 micrometers in diameter 90 copies of kaolin and ten copies of plastics pigments as embodiment 1 pigment whose aspect ratio is 18, 0.2% (solid content) of sodium polyacrylate was added to the pigment as a dispersant, it distributed using the Cau Les dispersion machine, and the pigment slurry of 65% of solid content was adjusted. As water-soluble adhesives, 35 copies and five copies of styrene butadiene copolymer latex solid content were added for oxidized starch to this slurry, water was further added to it, and the application liquid of 50% of solids concentration was obtained to it. The double-sided application was performed by blade coater so that it might become 8 g/m<sup>2</sup> in the high-quality stencil paper of U.S. tsubo 50 g/m<sup>2</sup> with dry weight per one side about this application liquid, and it dried with 120 °C hot air drying equipment, and the double-sided coated paper of 6% of moisture was obtained. Thus, with the calender which comprises a metallic roll and an elastic roll in the obtained double-sided coated paper, the skin temperature of the metallic roll was 70 °C, and data smoothing was fed and carried out. About the obtained coated paper, the quality evaluation like the following was performed and the result was shown in Table 1.

[0026] In embodiment 2 Embodiment 1, coated paper was obtained like Embodiment 1 except having set the aspect ratio of kaolin to 14. The quality result of the obtained coated paper was shown in Table 1.

[0027] In embodiment 3 Embodiment 1, coated paper was obtained like Embodiment 1 except having made combination number of copies of 75 copies and a plastics pigment into 25 copies for combination number of copies of kaolin. The quality result of the obtained coated paper was shown in Table 1.

[0028] In embodiment 4 Embodiment 1, coated paper was obtained like Embodiment 1 except having made combination number of copies of 97 copies and a plastics pigment into three copies for combination number of copies of kaolin. The quality result of the obtained coated paper was shown in Table 1.

[0029] In embodiment 5 Embodiment 1, coated paper was obtained like Embodiment 1 except having made combination number of copies of oxidized starch into 15 copies. The quality result of the obtained coated paper was shown in Table 1.

[0030] In embodiment 6 Embodiment 1, coated paper was obtained like Embodiment 1 except having made combination number of copies of oxidized starch into 45 copies. The quality result of the obtained coated paper was shown in Table 1.

[0031] In embodiment 7 Embodiment 1, coated paper was obtained like Embodiment 1 except having made [ combination number of copies of kaolin ] combination number of copies of 35 copies and a plastics pigment into ten copies for 55 copies and combination number of copies of calcium carbonate. The quality result of the obtained coated paper was shown in Table 1.

[0032] In embodiment 8 Embodiment 1, coated paper was obtained like Embodiment 1 except having set the aspect ratio of kaolin to 15 and the diameter having been 1.0 micrometer. The quality result of the obtained coated paper was shown in Table 1.

[0033]In embodiment 9 Embodiment 1, coated paper was obtained like Embodiment 1 except having set the aspect ratio of kaolin to 19 and the diameter having been 2.5 micrometers. The quality result of the obtained coated paper was shown in Table 1.

[0034]In embodiment 10 Embodiment 1, coated paper was obtained like Embodiment 1 except the skin temperature of the metallic roll of a calender having been 120 \*\*. The quality result of the obtained coated paper was shown in Table 1.

[0035]In comparative example 1 Embodiment 1, coated paper was obtained like Embodiment 1 except having set the aspect ratio of kaolin to 10 and the diameter having been 1.1 micrometers. The quality result of the obtained coated paper was shown in Table 1.

[0036]In comparative example 2 Embodiment 1, coated paper was obtained like Embodiment 1 except having set the aspect ratio of kaolin to 25 and the diameter having been 2.4 micrometers. The quality result of the obtained coated paper was shown in Table 1.

[0037]In comparative example 3 Embodiment 1, a plastics pigment was not blended but coated paper was obtained like Embodiment 1 except having made combination number of copies of kaolin into 100 copies. The quality result of the obtained coated paper was shown in Table 1.

[0038]In comparative example 4 Embodiment 1, coated paper was obtained like Embodiment 1 except having made combination number of copies of oxidized starch into five copies. The quality result of the obtained coated paper was shown in Table 1.

[0039]In comparative example 5 Embodiment 1, coated paper was obtained like Embodiment 1 except having made combination number of copies of oxidized starch into 55 copies. The quality result of the obtained coated paper was shown in Table 1.

[0040]In comparative example 6 Embodiment 1, coated paper was obtained like Embodiment 1 except having set the aspect ratio of kaolin to 13 and the diameter having been 0.3 micrometer. The quality result of the obtained coated paper was shown in Table 1.

[0041]In comparative example 7 Embodiment 1, coated paper was obtained like Embodiment 1 except the diameter of kaolin having been 3.4 micrometers. The quality result of the obtained coated paper was shown in Table 1.

[0042]In comparative example 8 Embodiment 1, coated paper was obtained like Embodiment 1 except having made 40 copies and combination number of copies of calcium carbonate into 50 copies for combination number of copies of kaolin. The quality result of the obtained coated paper was shown in Table 1.

[0043]In comparative example 9 Embodiment 1, although it was going to obtain coated paper like Embodiment 1 except having made combination number of copies of kaolin into 65 copies, and having made the plastics pigment into 35 copies, since the viscosity of application liquid was too high, it interfered with operability.

[0044]"A measuring method, a valuation method"

[The degree of white paper gloss] It measured according to JIS-P8142. Gloss is so good that a numerical value is large.

[Clark stiffness] It measured using the Clark stiffness meter (made by Kumagaya Riki Kogyo K.K.). Paper stiffness is so strong that a value is large.

[0045][Absorptivity] Visual observation was carried out and the surface of printed matter obtained by printing using 4 colors of offset press was evaluated.

O ... Good x ... A defect [A diameter and thickness] An electron microscope by JEOL Co., Ltd. (JSM-T300) performed surface observation, and it computed by measuring about 1000 grains by viewing.

[0046]

[Table 1]

	カオリン			フラスチック 成分 配合 部数	水溶性 成分 配合 部数	金属 ロール 温度	クラック 剛度	光沢 度	吸 水 性
	配合 部数	フラス ト比	直径						
	部		$\mu m$	部	部	℃	mm	%	
実施例 1	9 0	1 8	1. 8	1 0	3 5	7 0	1 4 7	6 3	○
実施例 2	9 0	1 4	1. 8	1 0	3 5	7 0	1 4 6	6 3	○
実施例 3	7 5	1 8	1. 8	2 5	3 5	7 0	1 4 3	7 5	○
実施例 4	9 7	1 8	1. 8	3	3 5	7 0	1 4 8	5 6	○
実施例 5	9 0	1 8	1. 8	1 0	1 5	7 0	1 4 0	6 8	○
実施例 6	9 0	1 8	1. 8	1 0	4 5	7 0	1 5 1	5 8	○
実施例 7	5 5	1 8	1. 8	1 0	3 5	7 0	1 4 1	5 5	○
実施例 8	9 0	1 5	1. 0	1 0	3 5	7 0	1 4 5	6 2	○
実施例 9	9 0	1 9	2. 5	1 0	3 5	7 0	1 5 0	6 1	○
実施例 1 0	9 0	1 8	1. 8	1 0	3 5	1 2 0	1 5 9	6 4	○
比較例 1	9 0	1 0	1. 1	1 0	3 5	7 0	1 3 5	6 0	○
比較例 2	9 0	2 5	2. 4	1 0	3 5	7 0	1 5 1	5 9	×
比較例 3	1 0 0	1 8	1. 8	0	3 5	7 0	1 4 8	4 0	○
比較例 4	9 0	1 8	1. 8	1 0	5	7 0	1 2 4	7 0	○
比較例 5	9 0	1 8	1. 8	1 0	5 5	7 0	1 6 1	4 4	×
比較例 6	9 0	1 3	0. 3	1 0	3 5	7 0	1 3 1	5 4	○
比較例 7	9 0	1 8	3. 4	1 0	3 5	7 0	1 5 3	4 9	○
比較例 8	4 0	1 8	1. 8	1 0	3 5	7 0	1 2 8	4 3	○

[0047]

[Effect of the Invention]The coated paper for printing obtained by the method of this invention had gloss and strong paper stiffness, and they were excellent in print job nature so that clearly from the result of the embodiment shown in Table 1.



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[Translation done.]